Unit Specification

UBT288 – Electrical science

Unit reference number: D/650/6632

Level: 3
Guided Learning (GL) hours: 20

Overview

This unit will provide all of the necessary underpinning knowledge of electrical science to enable learners to understand the natural and physical science behind electrical beauty therapy treatments.

Learning outcomes

On completion of this unit, learners will:

LO1 Understand the structure of matter

LO2 Understand electricity and the effects of an electric current

LO3 Understand natural and artificial electromagnetic radiation

Version 1

Unit content

LO1 Understand the structure of matter

Structure and function of an atom
Taught content
• Protons • Neutrons • Electrons • Nucleus

States of matter
Taught content
• Natural and physical science • Matter – anything that has mass and occupies space • Substances – 3 different physical states – solid, liquid and gas • Periodic table, elements, chemical symbols • A molecule – smallest part of a compound • Compounds – fixed composition, chemical reactivity, ions: anion – negatively charged, cation – positively charged, covalent bonding, ionic bonding (electro-valent)

LO2 Understand electricity and the effects of an electrical current

Measurements of electricity
Taught content
• Electrical pressure – Volts and voltage • Electrical power – Watts and wattage • Electrical current strength – Amps or amperes, milli-amps and amperage • Electrical resistance – Ohms, Ohm's law and relevance

Terminology associated with electrical equipment
Taught content
• Electricity/electric current – free flow of electrons • Electricity – static and dynamic • Alternating current – Hertz (Hz), mains electricity frequency of 50 Hz • Direct current • Polarity + or – • Rectifiers – diodes • Capacitors • Transformers • Potentiometer • Rheostat • Starter – small cartridge located in fluorescent lights • Oudin coil or resonator • Conductors • Insulators • Electric circuits • Fuses – protective device, cartridge fuse located in plugs, wire fuse/circuit breaker protect the wiring in a building • Correct wiring in a mains plug • Portable Appliance Testing (PAT) • Electrodes – moving – metal (electrolysis needles or facial galvanic), glass (high frequency), static – carbon/graphite (body faradic or body galvanic pads)

Electrical treatments and how their effects on the skin/body are achieved
Taught content
• Types of electrical current used on the face - Galvanic – direct current, metal electrodes – cathode and anode, indifferent or active, cation, anion, anaphoresis, cataphoresis, ionic disassociation, polarity, sodium hydroxide (alkali), hydrochloric acid, desincrustation, saponification effect, iontophoresis, beneficial substances repelled into the skin - High frequency – rapidly oscillating alternating current of high voltage low current, glass electrodes, oudin coil or resonator, saturator, argon or neon, ionisation of 02 to 03 (germicidal effect) producing an erythemic effect - Faradic – interrupted direct current, carbon/graphite single pad, electrolyte – saline solution, biphasic polarity, stimulation to muscle fascia - Micro-current – modified direct current, metal electrodes, shortens muscle fibres to improve muscle tone - Thermolysis, high frequency, short-wave diathermy, radio frequency – oscillating, alternating current of high frequency, oscillator, friction of water molecules within hair follicle produces heat causing coagulation/desiccation effect - Galvanic electrolysis – cathode (needle), anode, electrolyte (salt and water naturally occurring in tissue fluid), hydrogen gas, chlorine gas, sodium hydroxide (lye) has a chemical caustic effect within the hair follicle - Blend – combination of both currents to treat distorted follicles • Types of electrical current used on the body - Galvanic – direct current, carbon/graphite static pads – cathode and anode, indifferent or active, cation, anion, anaphoresis, cataphoresis, ionic disassociation, polarity, iontophoresis, beneficial substances repelled into the skin - High frequency – rapidly oscillating alternating current of high voltage low current, glass electrodes, saturator, ionisation of 02 to 03 (germicidal) effect - Faradic (electrical muscle stimulator) – interrupted direct current, carbon/graphite static pads, electrolyte – saline solution, monophasic or biphasic polarity, stimulation to muscle fascia - Micro-current – modified direct current, metal electrodes, shortens muscle fibres to lift and improve muscle tone

LO3 Understand natural and artificial electromagnetic radiation

Types of electromagnetic radiation
Taught content
• Different types of electromagnetic radiation – gamma rays, x-rays, ultra-violet, visible light, infra-red, radio waves, nanometres • Natural electromagnetic radiation spectrum, ultra-violet rays – UVA, UVB and UVC, frequencies, nanometres, penetration of different UV wavelengths to the skin • Artificial electromagnetic radiation – infra-red, radiant heat, nanometres, wavelength, inverse square law – distance, cosine law – angle • Ultra-violet radiation – mercury vapour lamps, wood lamp, sun bed

Effects of electromagnetic radiation on body tissue
Taught content
• Infra-red – warming the epidermal tissues for therapeutic purposes, hyperaemia • Radiant – deep heat effect to the dermis, vasodilation • Ultra-violet – melanocyte activity to give a tanning response – four stages – erythema, thickening of epidermis, desquamation, pigmentation, vitamin D production, germicidal effect, hyperkeratinisation, psychological feeling of wellbeing

Harmful effects of ultra-violet radiation on the body tissue
Taught content
• Sunburn, skin cancer, premature ageing, photo-aged dehydration, hyperpigmentation, hypopigmentation, allergic reactions, sun stroke, permanent eye damage

Assessment requirements

Learners must complete the assessment requirements related to this unit:

1. Theory examination

1. Theory examination

The theory content of learning outcomes 1-3 will be tested by an externally set theory examination at the end of the period of learning.

Learners must complete a theory examination for this unit. This will consist of a multiple choice question paper which is mapped to the relevant assessment criteria stated below.

The theory examination will test knowledge and understanding from across learning outcomes 1, 2 and 3. Learners should use the unit content sections of this unit to aid revision since exam questions will test the full breadth of this content over time.

Learning Outcome	**Assessment Criteria**
LO1 Understand the structure of matter	1.1 Structure and function of an atom
	1.2 States of matter

Learning Outcome	**Assessment Criteria**
LO2 Understand electricity and the effects of an electrical current	2.1 Measurements of electricity
	2.2 Terminology associated with electrical equipment
	2.3 Electrical treatments and how their effects on the skin are achieved

Learning Outcome	**Assessment Criteria**
LO3 Understand natural and artificial electromagnetic radiation	3.1 Types of electromagnetic radiation
	3.2 Effects of electromagnetic radiation on body tissue
	3.3 Harmful effects of ultra-violet radiation on the body tissue

Document History

Version	Issue Date	Changes	Role
V1.0	01/04/2023	First published	Product and Regulation Coordinator